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68804	7590	12/09/2008		
JOHN P. DE LUCA 17420 RYEFIELD CT. DICKERSON, MD 20842			EXAMINER BARTON, JEFFREY THOMAS	
			ART UNIT	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/722,738	Applicant(s) ORTABASI, UGUR	
	Examiner Jeffrey T. Barton	Art Unit 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 September 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-33 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-33 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 29 September 2008 has been entered.

Status of Rejections Pending Since the Office Action of 30 May 2008

2. The rejection of claim 17 under 35 U.S.C. §112, second paragraph is maintained.
3. All other previous rejections are withdrawn due to Applicant's amendment.

Claim Objections

4. Claims 1 and 15 are objected to because of the following informalities:
 - a. In claim 1 at line 13, the use of the word "being" is awkward. It is suggested that this be replaced with "is".
 - b. In claim 1 at line 28, the use of "and to generate" after the word "wavelength" is awkward. It is suggested that this be replaced with ", wherein said photovoltaic cells generate".
 - c. In claim 15 at line 18, "internals" and "areal" should be replaced with "internal" and "area", respectively.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. Claims 1-14, 25, and 30-33 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

In claim 1 at line 5, there is no support for "a high efficiency of about 65%" in the specification as originally filed. Claims 2-14 depend from claim 1 and are rejected on the same grounds.

In claim 6 at lines 2-3, there is no support for "outer surfaces that are mirrored" in the specification as originally filed.

Claims 6-9 lack support in the specification, since claim 5 has redefined the "secondary concentrator" of the claim to be the secondary concentrator of hyperbolic shape of the Cassegrainian system (e.g. secondary concentrator 434' of Figure 4), as opposed to secondary concentrator 20 of Figure 1. "Inner surfaces that are mirrored", "compound parabolic of hollow design", Bezier optimized contour", "dielectric", and "extractor rod" limitations find support in limiting concentrator 20 or 320 as shown in

Art Unit: 1795

Figures 1 and 3. (See Specification Paragraphs 0041 and 0053) There is no support for such limitation of hyperbolic secondary concentrator 434'.

In claim 8 at lines 3-4, there is no support for "optimal" acceptance angle or "optimal" concentration in the specification as originally filed. The specification teaches "maximum" acceptance angle and "highest" or "maximum" concentration. (Paragraph 0041, original claim 8)

In claim 9 at lines 4-5, there is no support for emitting photons "near" uniformly to provide "good" angular isotropy. Paragraph 0054 teaches emitting photons uniformly in all directions to provide angular isotropy. The newly added qualification is unsupported.

In claim 13 at lines 3-4, 9-10, there is no support for a "multiplexed or imbedded communications component" in the specification as originally filed.

In claim 13 at lines 5, 8, 13, 15-16, 19, there is no support for "fast photon detector" or "wavelength filter associated with each fast photon detector" in the specification as originally filed.

In claim 14 at lines 2-3, there is no support for "to allow frequency or color change in the power component of the multiplexed beam" in the specification as originally filed.

In claim 25 at lines 4-5, there is no support for emitting photons "near" uniformly to provide "good" angular isotropy. Paragraph 0054 teaches emitting photons uniformly in all directions to provide angular isotropy. The newly added qualification is unsupported.

Art Unit: 1795

In claim 30 at lines 2 and 6, there is no support for "multiplexed wavelengths" or "multiplexed radiation" in the specification as originally filed.

In claim 30 at lines 4, 8, and 9, there is no support for "communications component" in the specification as originally filed.

In claim 30 at lines 6-7, there is no support for "the fast photon detectors" in the specification as originally filed.

In claim 31 at lines 2-4, there is no support for any of the new limitations in the specification as originally filed.

In claim 32 at lines 5-6, 7-8, 11, and 12, there is no support for "communications component" or "communications output" in the specification as originally filed.

In claim 32 at lines 7 and 10, there is no support for "fast photon detectors" in the specification as originally filed.

In claim 33, there is no support for "the multiplexed wavelengths" recited in line 3, "fast photon detector" recited in lines 4 and 5, or "the corresponding output" (of the non-supported photon detector) recited in lines 5-6 of the claim.

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claims 1-33 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Art Unit: 1795

In claim 1 at lines 12-14, it is unclear what limitation is intended by the recitation "wherein the total aperture area of the opening [is] about 0.01 or less of the total internal surface area of the cavity". Is Applicant intending to limit the ratio of A_i to A_s to a value of 0.01 or less? If so, such limitation makes claim 10 redundant. Claims 2-14 depend from claim 1 and are rejected on the same grounds.

In claim 5 at line 5, "a primary concentrator" is recited, and it is unclear whether this is the same or different from the primary concentrator recited in line 2 of the claim.

In claim 15 at lines 12-14, it is unclear what limitation is intended by the recitation "said opening having an entrance aperture area A_i of about 0.01 or less of the total internal surface area of the cavity". Is Applicant intending to limit the ratio of A_i to A_s to a value of 0.01 or less? If so, such limitation makes claim 26 redundant. Claims 16-33 depend from claim 1 and are rejected on the same grounds.

In claim 17 at lines 1-2, there is no clear antecedent basis for "said Cassegrainian concentrator".

In claim 21, it is not clear whether "a secondary concentrator system" is different from or the same as "a secondary concentrator" recited in line 26 of claim 15. It is also not clear whether "a primary concentrator" recited in line 3 is the same as "a primary concentrator" recited in line 24 of claim 15.

In claims 22-25, it is not clear whether "said secondary concentrator" refers to the secondary concentrator recited in claim 15 or that of claim 21. It has been noted that "secondary concentrator" is used to describe multiple distinct components in the specification (e.g. secondary concentrator 20 of Figure 1 and paragraph 0046, similar

Art Unit: 1795

secondary concentrator 320 of Figure 3 and paragraph 0053, and secondary concentrator 434' of Figure 4 and paragraph 0060) Throughout the claims, the term "secondary concentrator" is used confusingly for these items. Applicant must amend the claims to clarify which structure is being claimed.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

11. Claims 1, 2, 4, and 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ronwin (US 5,879,472) in view of Holloman et al (US 4,976,789), and D'Amato et al. (IEEE Photonics Technology Letters reference)

Regarding claim 1, Ronwin discloses a photovoltaic cavity converter (Figure 1) comprising a housing having a cavity of generally optimized closed shape (60) having a light input aperture (Through which light transferring means 58 passes) and a total

Art Unit: 1795

internal surface area such that only a small portion of radiation admitted through the aperture can escape, defining total trapped energy as claimed (Column 5, lines 27-35), a concentrator that concentrates incoming radiation to a beam diameter smaller than the aperture (Guide 58; alternatively middle compartment 24 is a concentrator with input aperture at shutter 32), and a plurality of photovoltaic cells within the cavity (15; Column 4, lines 29-34)

Ronwin does not explicitly disclose the generically-recited light source 1 being a laser, the claimed conversion efficiency, the claimed ratio of input aperture to total internal surface area, or maximally responsive bandgap of the cells.

Holloman et al teaches that laser light can advantageously be transmitted through optical fibers to remote photovoltaic conversion systems for power generation. (Abstract; Figure 5)

D'Amato et al also teach transmission of laser light through optical fibers for photovoltaic conversion (Paragraph bridging pages 258 and 259), and teach optimization of the photovoltaic material in a single junction solar cell for maximum cell efficiency, reaching efficiency up to 59%, which is considered to broadly meet the limitation to "about 65%". (Abstract; 1st full paragraph of the 1st column of page 259)

It would have been obvious to one having ordinary skill in the art to modify the device of Ronwin by specifically providing the claimed 0.01 ratio of input aperture area to total internal area, because minimizing the input aperture size would reduce the amount of light that could escape the cavity, a goal stated by Ronwin. (Abstract; Column 5, lines 30-32) Although the ratio is not explicitly taught, the illustrated dimensions of

Art Unit: 1795

Figure 1 further render the ratio obvious, as the proportions shown would clearly meet the limitation.

It would also have been obvious to one having ordinary skill in the art to modify the system of Ronwin by selecting a laser light source, as taught by either Holloman et al or D'Amato et al, because these references both teach the advantageous transmission of laser light through optical fibers for remote photovoltaic conversion to electricity. Such selection of a conventional light source for photovoltaic conversion would have been a matter of choice obvious to one having ordinary skill in the art, particularly since Ronwin discloses only a generic light source 1. (Column 5, lines 27-33)

It would also have been obvious to one having ordinary skill in the art to select single junction solar cells having optimized properties (such as bandgap or quantum efficiency) for conversion of laser light at maximum efficiency, as taught by D'Amato, because it would increase the power output of the system.

12. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ronwin, Holloman, and D'Amato et al as applied to claims 1, 2, 4, and 10-12 above, and further in view of Woolf et al. (US 4,773,945)

Ronwin, Holloman et al, and D'Amato et al are relied upon for the reasons given above.

None among Ronwin, Holloman et al, and D'Amato et al explicitly disclose the instant back surface mirror.

Art Unit: 1795

Woolf et al teach that it is advantageous to incorporate reflective back surface coatings onto photovoltaic cells to improve overall collection efficiency. (Column 1, lines 42-48)

It would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify the device of Ronwin, Holloman et al, and D'Amato et al by incorporating a back surface reflector, as taught by Woolf et al, because Woolf et al teaches that this improves overall collection efficiency of the cell.

13. Claims 5-7, 9, 15-18, 20-23, and 25-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ronwin, Holloman et al, and D'Amato et al as applied to claims 1, 2, 4, and 10-12 above, and further in view of Rao et al. (US 5,295,143)

Ronwin, Holloman et al, and D'Amato et al are relied upon for the reasons given above. Regarding claims 6, 7, 9, 21-23, and 25, lens 56 reads on the secondary concentrator with extractor rod attached (Figure 3)

None among Ronwin, Holloman et al, and D'Amato et al explicitly discloses the primary and secondary concentrators or Cassegrainian arrangement claimed.

Rao et al teaches a Cassegrainian concentrator having parabolic primary and hyperbolic secondary mirror (Figure 4; Column 4, line 59 - Column 5, line 11) as claimed, used to focus laser light for conduction along an optical fiber.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device of Ronwin, Holloman et al, and D'Amato et al, by focusing the laser light for entry into the conducting optical fiber 58 using a

Art Unit: 1795

Cassegrainian concentrator, as taught by Rao, because Rao demonstrates its effectiveness in focusing laser light for impingement and entry into an optical fiber. Such modification would be motivated also by the respective beam and fiber sizes for the device. Selection of such conventional focusing techniques for a known purpose would have been obvious to one having ordinary skill in the art.

14. Claim 19 rejected under 35 U.S.C. 103(a) as being unpatentable over Ronwin, Holloman et al, D'Amato et al, and Rao et al as applied to claims 5-7, 9, 15-18, 20-23, and 25-28 above, and further in view of Woolf et al. (US 4,773,945)

Ronwin, Holloman et al, D'Amato et al, and Rao et al are relied upon for the reasons given above.

None among Ronwin, Holloman et al, D'Amato et al, and Rao et al explicitly disclose the instant back surface mirror.

Woolf et al teach that it is advantageous to incorporate reflective back surface coatings onto photovoltaic cells to improve overall collection efficiency. (Column 1, lines 42-48)

It would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify the device of Ronwin, Holloman et al, D'Amato et al, and Rao et al by incorporating a back surface reflector, as taught by Woolf et al, because Woolf et al teaches that this improves overall collection efficiency of the cell.

Art Unit: 1795

15. Claims 8 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ronwin, Holloman et al, D'Amato et al, and Rao et al as applied to claims 5-7, 9, 15-18, 20-23, and 25-28 above, and further in view of Ortabasi. (US 6,057,505)

Ronwin, Holloman et al, D'Amato et al, and Rao et al are relied upon for the reasons given above.

None among Ronwin, Holloman et al, D'Amato et al, and Rao et al explicitly disclose the instant Bezier optimized contour of the secondary concentrator.

Ortabasi teaches that Bezier surfaces approximating curved lens surfaces provide ease of fabrication in photovoltaic concentrator systems. (e.g. Column 5, lines 53-65)

It would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify the device of Ronwin, Holloman et al, D'Amato et al, and Rao et al by using Bezier surfaces to approximate the curved concentrator surfaces, as taught by Ortabasi, because Ortabasi teaches that this provides ease of fabrication of the concentrators. Selection of the particular acceptance angles, concentration, and height would be matters of design selection to one having ordinary skill in the art in the absence of evidence of criticality.

Response to Arguments

16. Applicant's arguments with respect to the previous rejections have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. Jeffrey T. Barton whose telephone number is (571)272-1307. The examiner can normally be reached on M-F 9:00AM - 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jeffrey T. Barton/
Art Unit 1795
5 December 2008